Postdischarge Nutrition of Preterm Infants: More Questions than Answers

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Abstract
Postnatal growth retardation is inevitable in preterm infants, the more immature the infant the greater the degree of postnatal growth retardation at hospital discharge. After hospital discharge, several studies have shown that growth is poorer in preterm infants fed a standard term formula than those fed a nutrient-enriched infant formula. This is not surprising because term formulas are designed to meet the requirements of the term infant, not the more rapidly growing preterm infant. After hospital discharge, breastfed infants do not grow as well as their formula-fed counterparts. Yet, there are no randomized controlled trials comparing growth in breastfed infants who did and did not receive nutrient supplementation. If mature human milk is designed to meet the needs of the term infant then breastfed preterm infants may also benefit from nutrient supplementation. Questions persist about nutritional support of preterm infants after discharge. What is the ideal composition of a postdischarge formula? Given the wide heterogeneity in nutritional status of preterm infants at hospital discharge and the difference in growth rates and composition between girls and boys, it is not clear that one formula can or will meet the nutritional needs of all infants. Studies in which infants were fed a nutrient-enriched formula to ≥6 months’ corrected age show the most consistent advantage while those in which the nutrient-enriched formula was fed to ≤2 months’ corrected age had no effect on growth. Whether this is a reflection of the duration of feeding or not is unclear. Further studies are needed to examine this issue. To date, little attention has focused on the role and/or effects of complimentary feeds these infants. Complimentary feeds will confound the effects of any study examining postdischarge growth in preterm infants. However, they may also be an important adjunct in meeting nutritional needs of these high-risk infants. Further studies are also needed to examine this issue.

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Introduction

Several studies have examined postnatal growth in preterm infants during the initial hospital stay and noted that most preterm if not all very low birth weight infants are growth retarded at hospital discharge [1–7]. In studies where nutritional intake was measured, recommended dietary intakes took time to establish and infants accrued a significant nutrient deficit that was directly related to the growth deficit [1–5].

In studies where intake was not measured poor growth was related to poorer clinical outcomes [6, 7]. This is not surprising because it takes time to establish recommended dietary intakes in the infant with a complicated neonatal course. Once established, intake may be interrupted during episodes of clinical instability further increasing the nutrient deficit. However, other factors may underpin the development of growth retardation in these infants.

Current recommendations are that the rate of weight gain parallel that of the fetus of the same gestational age once birth weight has been regained [8, 9]. Yet, an infant of 27 weeks’ gestational age weighing ~1,000 g at birth who regains birth weight by 2 weeks of age and grows at the intrauterine rate will weigh ~540 g less than the fetus and be growth retarded. If current recommendations are met most, if not all, very low- birth weight infants will be growth retarded at hospital discharge.

Current recommendations assume requirements are similar for all preterm low birth weight infants [8, 9]. However, Ziegler [10] has noted that protein and energy requirements change with advancing gestation and a formula with a protein:energy ratio of 3.0 g/100 kcal, that is currently recommended for preterm infants, will not meet the needs of the very low birth weight infant.

Recommended dietary intakes are based on needs for maintenance and normal growth [8, 9]; no allowance is made for recovery or ‘catch-up’ growth [11]. In the study of Embleton et al. [3], the accrued protein deficit, i.e., need for recovery, varied from 15 to 25 g/kg/day. To recoup this deficit before hospital discharge, an additional 0.5–1.0 g/kg/day would be required, further confusing the issue.

Although many factors contribute to the development of postnatal growth retardation and the degree of postnatal growth retardation will vary, depending upon the level of immaturity of the infant, one point is clear: close attention must be paid to nutritional support and growth of these infants in the first 12–18 months of life.

Postdischarge Nutritional Support of the Preterm Infant

Several studies have examined postdischarge growth in preterm infants [12–18]. Although some ‘catch-up’ growth has been observed, preterm infants
do not grow as well as their term counterparts. There are several possible reasons for this.

Current in-hospital feeding practices ensure that preterm infants are malnourished and growth retarded at initial hospital discharge. A ‘critical epoch’ of growth may, therefore, have been missed. Preterm infants also have greater morbidity than term infants during the first year of life [19–23] and intercurrent illness will affect growth, irrespective of whether they are admitted to hospital or not.

Until relatively recently, little attention had been paid to nutritional factors in the pathogenesis of this problem. In most early studies, infants were fed either human milk or a term infant formula after hospital discharge [12–18]. Both feeding regimens are designed to meet nutritional needs of the term rather than the rapidly growing preterm infant. Infants, therefore, were partly underfed during the first 6–12 months of life.

Lucas et al. [24] randomized preterm infants (birth weight ≤1,800 g, gestational age ≤34 weeks; n = 16/group) to be fed either a term formula or a nutrient-enriched infant formula after hospital discharge. Those fed the nutrient-enriched formula grew better and had better bone mineralization at 3 and 9 months’ corrected age [25]. However, Chan et al. [26] were unable to show any differences in growth between preterm infants fed a term formula and those fed either a nutrient-enriched or preterm infant formula after hospital discharge.

Cooke et al. [27–29] randomized otherwise ‘normal’ preterm (≤1,750 g birth weight, ≤34 weeks’ gestation) infants to one of three feeding groups: one group (n = 49) was fed a nutrient-enriched infant formula between discharge and 6 months, the second (n = 54) group a term formula between discharge and 6 months and the third (n = 26) a nutrient-enriched formula between discharge and term and a term formula between term and 6 months’ corrected age.

The results are presented in figures 1 and 2. Infants fed the nutrient-enriched formula between discharge and 6 months had lower volumes, similar energy but greater protein intake than the other groups (fig. 1). Increased protein intake was paralleled by greater serum urea nitrogen, weight and length gains, which, in turn, were reflected by greater body weight, length, head circumference, lean mass and absolute (g) but not fractional fat (%) mass (fig. 2). No consistent differences were detected in growth or body composition between the second and third groups.

Initial analyses indicated that effects on growth were predominantly in boys. A subsequent analysis, when data were converted to z-scores, is revealing and is presented in figure 3. Between birth and discharge, z-scores for body weight fell in boys in both treatment groups. Between discharge and 6 months, z-scores were consistently greater in boys fed the preterm formula. The pattern is exactly the same in girls, indicating that girls also benefited when fed the nutrient-enriched formula.
Carver et al. [30] randomized preterm infants (<37 weeks, ≤1,800 g) to be fed either a nutrient-enriched formula (n = 67) or a term formula (n = 56) between discharge and 12 months’ corrected age. Infants were stratified according to birth weight (<1,250, ≥1,250 g). No differences were detected in energy intake but protein intake was greater in infants fed the nutrient-enriched formula. Growth was also better, particularly in infants <1,250 g who were heavier, longer and had a greater head circumference at 6 months’ corrected age.

Lucas et al. [31] randomized a group of preterm infants (<37 weeks, <1,750 g) to be fed either a nutrient-enriched (n = 113) or term (n = 116) formula between discharge and 9 months’ corrected age. Infants fed the enriched formula grew better, i.e., they were heavier and longer at 9 months.

**Fig. 1.** Nutrient intakes and serum chemistries in study infants. Disc = Discharge.
De Curtis et al. [31] randomized a group of preterm infants (<35 weeks’ gestational age, birth weight of <1,750 g) to be fed either a nutrient-enriched formula (n = 16) or a standard term formula (n = 17) between hospital discharge at ∼37 weeks and ∼2 months’ corrected age. No significant differences were detected in the volume of formula intake but protein and energy intakes were greater in infants fed the nutrient-enriched formula. No differences were detected in growth or body composition between the treatment groups.

**Fig. 2.** Growth and body composition in study infants. Disc = Discharge.

and longer at 18 months than infants fed the term formula, an effect that was more marked in boys than girls. No differences were detected in neurodevelopmental outcome between the treatment groups.
Litmanovitz et al. [33] randomized a group of very low birth weight infants to be fed a nutrient-enriched (n = 10) or standard term (n = 10) formula between hospital discharge and 6 months' corrected age. No differences were detected in growth, bone strength and/or bone turnover between the treatment groups.

Henderson et al. [34] recently did a systematic review examining the use of a caloric and protein-enriched formula for improving growth and development following hospital discharge. These authors concluded that there is 'little evidence that feeding' with nutrient-enriched formulas 'affected growth and development'. As such, their conclusions merit scrutiny.

Energy and protein contents of the nutrient-enriched formulas varied from 72–80 kca/100 ml and 1.8–2.2 g/100 ml, as did the duration of intervention, term to 12 months, and sample sizes used, 20–229, while some studies stratified for degree of immaturity and/or sex and others did not. Given the differences in study design and sample sizes it is not clear that they are entirely comparable.

The first outcome variable evaluated was 'growth during the trial period'. The results of one study were used, that of de Curtis et al. [32], wherein the sample size was 33 and hardly representative. The endpoint was gain in weight, crown–heel length and head circumference between 36 weeks and 2 months' corrected age. Yet, growth velocity changes rapidly during this time (see fig. 1) and that which is averaged over a 12-week period may not reflect early but significant differences between the groups [27].

The second endpoint was 'longer-term growth', i.e., weight, length and head circumference at 6, 9 and 18 months' corrected age. Data from only one study was used at 6 months [33] and one at 9 months [31], again not entirely comparable.
representative. The third endpoint was neurodevelopmental outcome at 18 months. The meta-analysis included the studies of Lucas et al. [31] and Cooke et al. [28], a sample size of 358 infants. No differences were detected between infants fed the standard and nutrient-enriched formula, a valid conclusion under the circumstances.

The conclusions drawn by Henderson et al. [34] on ‘growth’ but not on development, therefore, must be questioned. A closer look at these studies is revealing. In the study of Cooke et al. [27–29], one group was fed the nutrient-enriched formula to term and no growth advantage was detected. In the study of de Curtis et al. [32], the nutrient-enriched formula was fed to 2 months and no growth advantage was detected. Yet, in the studies with an adequate sample size, where the nutrient-enriched formulas were fed to 6 [27–29], 9 [31] and 12 [30] months, growth was better, suggesting that duration of feeding is an important consideration.

In the studies of Cooke et al. [27–29], Carver et al. [30] and Lucas et al. [31] infants were stratified according sex. In these studies, the effect of diet was greatest in males. This is not surprising because boys are programmed to grow faster and accrete more lean mass [35] and, therefore, benefit from a higher protein-to-energy ratio. This is illustrated in figure 4 where boys fed the nutrient-enriched formula grew faster and accreted more lean mass than girls fed the same formula [29].

**Fig. 4.** Body composition in girls and boys fed the preterm infant formula. Disc = Discharge; T = term.
In the study of Carver et al. [30] infants were stratified according to birth weight, <1,250 and 1,250–1,800 g. Infants <1,250 g also seemed to benefit more from the nutrient-enriched formula. This also is not surprising. At hospital discharge, the more immature the infant, the greater the accrued nutrient deficit, the more likely the infant is to benefit from a postdischarge nutrient-enriched formula.

An additional consideration is the introduction of complimentary feeds (CF). All of these studies were performed at a time when CF is introduced. Yet, none of these studies provided any information on the timing of introduction and/or the nature of the CF or the possibility that CF affected the amount of formula consumed.

In the study of Cooke et al. [27–29], it was hypothesized that if intake more adequately met requirements, then infants fed the nutrient-enriched formula would be satisfied longer and CF would be introduced later.

A wide variation was noted in the timing of the introduction of CF and no differences were detected in corrected age between infants fed the nutrient-enriched formula and those fed the term formula (66 ± 34 vs. 61 ± 29 days).

It is recommended that CF not be introduced before 4 months’ corrected age [36]. Infants were, therefore, stratified into those who were fed CF before and after 4 months. Infants who were fed CF early were heavier (fig. 5),

\textbf{Fig. 5.} Growth in infants weaned before (early CF) and after (late CF) 4 months corrected age. Disc = Discharge.
longer and had a greater head circumference (data not presented) than those who were fed CF later, irrespective of which formula was fed. Thus, infants who were fed CF early may be inherently different from those who were fed CF later.

In summary, results from larger studies suggest that preterm infants, particularly males and very low birth weight infants, grow better when fed a nutrient-enriched formula following discharge until 6 months' corrected age or beyond. Better growth primarily reflects increases in lean body mass.

The Breastfed Infant

Before hospital discharge, preterm infants fed human milk do not grow as well as infants fed nutrient-enriched formulas [37, 38]. It is, therefore, recommended that human milk be fortified with additional nutrients [9]. Growth improves but it is still not as good as in those fed a preterm infant formula [2]. Why is this?

Fortifiers differ in nutrient composition and it is unclear whether any really meet requirements. This, perhaps, is not surprising because the composition of human milk varies widely [39], is rarely measured and there is no way of knowing what the infant is really receiving. If intake less adequately met requirements, then the accrued nutrient deficit is greater and growth is poorer.

After hospital discharge, breastfed infants also grow more poorly than those fed nutrient-enriched formulas [26, 31, 40]. This again is not surprising. Mature human milk is designed to meet the needs of the term infant and not the preterm infant. Breastfed infants are generally fed fortified human milk before discharge, have accrued a greater nutrient deficit. In effect their needs for ‘recovery’ are also greater.

There are other aspects of concern for these infants. Infants fed unsupplemented human milk not only have poorer growth but also anomalies in bone mineral accretion and metabolism [26, 31, 40] which can be related to outcome in the short term, e.g. osteopenia [41] and fractures [42] and long term, e.g. poorer linear growth [43].

In a study examining growth and body composition after hospital discharge, infants fed a term formula had poorer bone and increased fat accretion when compared to those fed an enriched-nutrient formula [44]. Wauben et al. [40] have also noted poorer bone and increased fat accretion in infants fed human milk compared to a nutrient-enriched formula.

These data support the idea that ‘we are what we eat’. When mineral intake is inadequate infants are at risk for deficiencies in mineral accretion. If the protein-to-energy intake is inadequate then, as in term infants [45], infants will accrete less lean but increased fat mass. Whether either anomaly in some way alters ‘programming’ and, therefore, health in adult life remains to be determined.
Outstanding Issues

Questions remain about the feeding of nutrient-enriched formulas to preterm infants during the first year of life. The first relates to formula composition. What is the ideal composition of these formulas? Will one formulation meet the varying needs of a heterogeneous group of growth-retarded infants? Will one formulation meet the needs of girls and boys?

There are major differences in energy, protein, mineral and micronutrient content between formulas used in previous studies. While most studies showed a growth advantage the magnitude of effect varied, the study with the most consistent growth advantage was closest to that of a regular preterm formula [27–29].

How long should these formulas be fed? In studies where the nutrient-enriched formula was fed to term or 2 months no advantage was noted. However, in studies where a nutrient-enriched formula was fed to 6, 9 and 12 months the most consistent advantage was noted. Whether 6 is better than 9 or 12 months or vice versa remains unclear.

The introduction of CF is an important confounding variable when assessing the effects of nutrient-enriched formulas on growth and developmental outcome. The timing, nature and contribution of CF must be clearly documented and/or controlled when examining outcome in this nutritionally vulnerable group of infants.

Breastfed infants might benefit from additional nutrient supplementation, achieving this, however, is problematic. Fortifiers could be used. Alternatively, a nutrient-enriched formula might also be fed once breastfeeding is fully established. Breastfeeding during the day supported by nutrient-enriched formula at night might not only improve growth but also prolong breastfeeding in these infants.

References

Postdischarge Nutrition in Preterm Infants


**Discussion**

**Dr. Chubarova:** When I was a teenager we were told to introduce solid foods for premature babies much earlier than term babies and mostly it was cereals, but I am not sure it improved growth. If you suggest introducing solid foods earlier, what foods are you talking about?

**Dr. Cooke:** It doesn’t change that much. It is fairly consistent and we are talking about levels that are in the range of 20, 30 or 36 mg/dl. None of these children develop a BUN above 40 mg/dl or ~6 mmol and that is the crucial issue.

**Dr. Beaumier:** About the principle of giving the mothers a rest when the babies are very hungry and actually eating all the time. We came across an idea to actually express breast milk and fortify it at least twice a day. This can be given to the baby by someone other than the mother and she can rest. You talked about supplementation as a growth avenue but what about long-chain polyunsaturated fatty acids (LCPUFAs), what about other nutrients that you haven’t mentioned in your talk?

**Dr. Cooke:** We focused on protein-energy malnutrition because we think that is the rate-limiting step in preterm infants, particularly boys [1]. The nutrient-enriched formulas have LCPUFAs and deficiency appears unlikely. One issue that I have not raised is iron status in these infants. In our original study, we compared two levels of iron intake, 0.5 and 0.9 mg/100ml of formula [2]. There were no differences in iron nutritional status during the first year of life between the groups. However, we would support the idea that post-discharge formulas contain a minimum level of 0.9 mg/100ml.

**Dr. Fusch:** Was zinc the same?
Dr. Cooke: Zinc nutritional status was not evaluated in these infants but it could also be an area of concern. However, no infant failed to thrive but grew at growth rates similar to the term infant at the same corrected age [1].

Dr. Griffin: I just have a comment to make about the complementary feed issue, just to remind people that there is a randomized control trial of complementary feeding post-discharge in preterm babies [3]. A strategy of using weaning foods with higher energy and protein densities (and more iron and zinc) leads to better catch-up growth, which is interesting, as it suggests that if there is a critical period for growth in these infants it is probably a lot broader than we might initially have thought.

Dr. Puplampu: Some children who were initially breastfed and then introduced to formula later reject breast milk. Is it possible that the weight gain noticed in children fed fortified breast milk could be due to water retention caused by the phosphate content?

Dr. Cooke: I do not think so. Term infants fed marginal levels of protein upregulate volume so that both protein and energy intake increase. Weight gain improves, reflecting increased fat rather than lean mass accretion [4]. A similar scenario also appears to occur in preterm infants fed supplemented human milk [5]. Weight gain most likely reflects increased fat and lean mass accretion.

Dr. Costalos: I think it is wrong to put babies of 1,000 and 2,000 g together. I don’t think babies of 2,000 g, unless they are IUGR, really need formula. We just completed a 2-year study giving babies post-discharge formula and a lot of them really grew very fast but we didn’t select the babies. The ones who are going to need this post-discharge formula are babies under 1,000 g and IUGR babies. If we put them all together perhaps they unnecessarily get too many calories. Coming back to the cereals which were mentioned before, there was a study where cereals were introduced to these babies at the age of 13 weeks and they had a better head growth at the age of 1 year, which is perhaps important.

Dr. Cooke: Nutritional status is quite variable at hospital discharge, the smaller and more immature the infant at discharge the greater the degree of malnutrition [6]. It may be simplistic to assume that one formulation will meet the needs of all preterm infants. To date, studies have focused on infants weighing ≤1,750 g at birth, with boys and those weighing ≤1,250 g seeming to benefit most. Yet we must start somewhere and this is just the beginning for all appropriately grown infants weighing ≤1,750 g at birth. I really can make no recommendations on the small for gestational age infant.

Dr. Van Dael: Knowing that there is still a lot of science to be done on preterm optimal nutrition, how would you react to the fact that some governments lay down particular nutritional requirements for preterm formulas. Take India for example, where they say that the protein composition should be 30% casein and 70% whey, and in China where there is no particular recommendation for preterm formulas but where a preterm formula needs to comply with term infant formula compositions.

Dr. Cooke: I am not really sure how to answer this question. If and when a government rules on this issue then one would hope that nutritional expertise has already been obtained and is the basis for the ruling. I am also not sure how many infants weighing ≤1,000 g are surviving in either India or China and/or whether it is a major health care consideration.

Dr. Putet: I am a little confused about the terms of post-discharge formula and term formula because we should perhaps think more about the protein content and calorie content. Some discharge formulas have the same caloric content or same protein content as some term formulas. You showed data in which the main difference was the protein intake. Can you comment on the fact that the 4-month infant who is drinking milk can modulate the volume intake, making the most important thing not perhaps the caloric intake but the protein intake? We know in term infants that by
increasing the protein intake of the formula a little with the same energy intake they will grow better, they will be taller and weigh more at 1 year of age. So the question is what is the most important protein or energy intake knowing that the baby will modulate according to the total energy of the day?

Dr. Cooke: Energy content is really what determines intake. However, when protein intake is marginal the volume of intake is further increased to increase protein intake. In effect, infants will gain more weight, the gain primarily reflecting fat rather than lean mass [4]. Protein content, when it is low, is also important.

Dr. Haschke: We had a Nestlé Nutrition Workshop 1 year ago at Half Moon Bay in California, in which long-term outcome was the major topic. One message which I still remember from Dr. Lucas was ‘grow fast pay later’. How long should we feed such formulas? Nobody so far has really evaluated the long-term positive or negative outcome of feeding such formulas with a high protein content for up to 9 or 12 months. I fully agree with the concept of the need of the premature infant for catch-up growth until it has reached a certain weight, let’s say the birth weight of the term infant. Assuming that the body composition is not too different from that of a term infant, why are we continuing to feed these infant formulas without looking at the long-term outcome? It might be, with a high protein intake, that we stimulate certain growth factors which later on result in increased fat accumulation of the body. So far nobody knows this and I strongly feel that we have to be very careful, in particular on how long we should recommend feeding these formulas.

Dr. Cooke: Poor nutrition can be directly related to poorer neurodevelopmental outcome in preterm infants [7]. The idea that ‘by growing fast you may pay later’ is interesting. It is based upon data showing higher proinsulin levels, a measure of insulin resistance, in preterm infants fed a nutrient-enriched diet compared to those fed a lower nutrient diet during early life [8]. However, proinsulin levels in the enriched group were similar to a reference group of term breastfed infants indicating that those fed the nutrient-enriched diet were at no greater risk, while those fed the lower-nutrient diet were at lower risk compared to the reference infants. I agree with you, the key issues are what we should feed, how long we should feed it and what measures of outcome should we be looking at. It should be noted that infants in our original study had a body weight and composition similar to the term infant at the same corrected age [1].

Dr. Fuchs: I am curious as I see that you use weight for age, length for age and head circumference as your growth indexes. But I don’t understand why you don’t use weight for length. If your sample sizes are large enough, then it is not so important, but the sample sizes in the cited studies are really small enough that it does make a difference.

Dr. Cooke: When we aim to rehabilitate severely malnourished children that are not preterm infants, we aim for an ideal weight for height and then when we overshoot that, that is when we get concerned. If we get an obese child, that may impact the question programming.

Dr. Fuchs: Let me comment. If you could measure body composition would you think that it is a better reflection of the degree of leanness or fatness, than weight for length?

Dr. Cooke: I am not sure but my interpretation of the data is that with DEXA lean mass is measured more accurately than fat mass. Our original concern related to energy intake and the possibility of excess energy storage in infants fed the nutrient-enriched formula, so we used it to assess fat mass.

Dr. Aly: As I understood fortification is important but how can it be done properly? Can we conclude that most premature babies weighting 1,500 g and more can depend upon the preterm formula as an added nutrient to the mother’s milk, in case it is available, or even as a single mode of feeding after discharge?
Dr. Cooke: There are no randomized control trials examining post-discharge intervention in breastfed preterm infants. In principle, term human milk was designed for the term infant. As such it does a marvellous job but it was never designed for the preterm infant. We, therefore, must be circumspect when advising a breastfeeding mother whose infant is not ‘thriving’.

Dr. Aly: No, I mean could we depend upon the preterm formula as a single mode of feeding for these preterm babies? In some countries after discharge of preterm babies, it is difficult to prescribe fortification for reasons of sterilization, availability, cost, etc. It is much easier to prescribe a preterm formula which has the right composition, is easy to prepare, and gives high energy and protein intake. So why can we not make this conclusion?

Dr. Cooke: We need the data that outcomes are better in infants supplemented with preterm formula than in non-supplemented breastfed preterm infants after hospital discharge before we can make a recommendation. In an infant who is not thriving then one might study the BUN. If it is low then supplementation with a preterm formula might be appropriate.

Dr. Beaumier: Should we still look at actual growth, weight, length and so on, or should we look at functional outcome? What is the difference when as an adult the patient has actually gained 2 cm or not, but is bright and healthy? It goes along with what you were saying about the comments of Dr. Lucas ‘grow fast pay later’, and how is this related to adult nutrition? We must not forget that the American diet is not good, and we prepare babies for a good diet but as adults they have a bad diet.

Dr. Cooke: To date, we focused on anthropometric and developmental outcomes. But relating poor growth to poor development is less than clear-cut, in that it is confounded by the effects of immaturity on the developing CNS. We need to be able to relate growth to more immediate measures of outcome, e.g. immunologic function, so that intervention can be instituted and evaluated. We really do not know what level of growth retardation is significant.

Dr. Griffin: I just wanted to make a comment about the ‘grow fast pay later’ theory. There really are almost no data for or against this being a legitimate concern in preterm babies. If you take a step back and look at the Barker hypothesis, the babies that do badly are small at birth, they are small at 1 year of age and they are big after 4 years of age, and that is an entirely different growth pattern than we see in our babies. Our babies are born generally appropriately sized, but then they become profoundly malnourished. When we intervene the best event is, if they are going to catch up, they will catch up by about 1 month corrected age. Obviously you don’t want to continue and make them fat later on. This is an entirely different pattern of growth to those high risk Barker hypothesis babies.

References

Cooke

